

Central US Disasters
Visualizing the New Madrid Earthquake Seismic Zone
for Improved Hazard Assessments

by

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SETH

I grew up in the Midwest, and back home, we prepared for natural disasters like tornadoes, but most of the time, we don't think about the threat of earthquakes.

AUSTIN

Our study area is the New Madrid Seismic Zone, which occurs in the Central United States. Many minor earthquakes have occurred in this region. However, in 1811, and 1812, three earthquakes took place, all of which had a magnitude greater than 7.

KATRINA

Contributing to the disaster management cycle of preparedness, response, recovery and mitigation is crucial in the face of disasters. We don't know when the next earthquake will occur, but we can prepare for it. Thus, we have partnered with DHS, Open Hazards, E-DECIDER, and QuakeSIM to enhance their decision making capabilities before, during, and after earthquake events.

ANDREA

Hi, I'm Andrea Donnellan, and I'm a research scientist at JPL, and I'm the principle investigator of NASA's QuakeSIM project. QuakeSIM is a project that integrates remotely sensed imaging data with models and other data and applications in order to better understand the earthquake process. From that, we can mitigate risk from earthquakes and also do damage response following earthquakes.

MARGARET

So, E-DECIDER is a project that uses remote sensing data and geophysical modeling tools to help identify areas of greatest damage to help prioritize the response.

SETH

Our project has three main objectives, all driving us towards enhancing the decision making capabilities of our end users, while also increasing the pub-

lic's awareness of earthquake risks and hazards within the region.

KATRINA

For our methodology we took two different approaches in order to meet our end users' needs. The first approach is based on QuakeSIM and E-DECIDER, both NASA sponsored toolsets, which allowed us to model different earthquake scenarios and assess areas of ground deformation and potential infrastructural damage. For our second approach, we used NASA Earth observation data sets in order to detect damage caused by natural disasters in our study area as a proof of concept for future and major earthquake events within the Central United States.

AUSTIN

This is a simulated interferogram of a worse case earthquake event, along the New Madrid Seismic Zone, with a moment magnitude of 7.4 and an average slip of 3 meters. Here we see a more realistic event along the 5km long rupture with a slip of 31 centimeters along the Central Arm of the New Madrid Fault.

KATRINA

The image that you see here is a ground tilt map generated from the displacement output from QuakeSIM's crustal deformation model following a magnitude 7.4 event in our study area. This tilt map represents the percent change of slope following a seismic event. Tilt maps such as these are important to us, in order for us to assess the changes in flow of water and sewage pipelines following a major seismic event. This is of importance to public officials within the study area.

SETH

Using Landsat 7 data, we mapped damage from a tornado in Joplin, Missouri. The damage is represented here in red. As a proof of concept, we can apply this methodology to mapping damage from future earthquake events.

AUSTIN

We transitioned our methodologies to our end users with a robust damage and hazard assessment package.

SETH

This package will their decision making process throughout the disaster management cycle.

KATRINA

And we have learned how useful NASA sponsored crustal deformation products and Earth observations are in order to better understand earthquake potential in the Central United States.